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M. I. KABACHNIK'S WORK IN THE FIELD OF ORGANOPHOSPHORUS COMPOUNDS

M. I. Kabachnik was elected Corresponding Member of the Academy of Sciences USSR in the specialty of organic chemistry at a meeting of the Department of Chemical Sciences of the academy held on 19 and 20 October 1953.

Kabachnik is a specialist in the fields of organoelemental compounds, heterocyclic compounds, and theoretical organic chemistry. Although Kabachnik has concentrated primarily on synthetic organic chemistry, he has also done systematic work directed toward the solution of problems in fields related to that of organic chemistry but lying outside of it, i.e., those of physiology, biochemistry, medicine, and agriculture. Among Kabachnik's scientific works and inventions, the principal place is occupied by investigations on organic syntheses. In the course of these investigations, he discovered new chemical reactions and developed new synthetic methods on the basis of the reactions in questions. Thus, he proposed methods for the synthesis of beta-halogenated esters of phosphorous acid, of beta-halogenoalkylphosphonic acids and their diverse derivatives, and of esters of vinylphosphonic acid. These methods are based on the reaction of alkenes with halogen compounds of trivalent phosphorus, i.e., a type of conversion which had been investigated by Kabachnik. Furthermore, Kabachnik developed a method for the synthesis of alpha-halogenoalkylphosphonic acids based on a new reaction of aldehydes or ketones with halogen compounds of trivalent phosphorus. Recently, he developed a method for the synthesis of alpha-aminophosphonic esters from aldehydes, dialkylphosphites, and ammonia on the basis of a reaction discovered by him.

In addition to the development of new synthetic methods, Kabachnik's principal aim in his research work is the finding of new classes of organic substances, with the aid of which various problems of a theoretical or practical nature can be solved. He synthesized the first known representatives of the following new classes of compounds: alpha-ketophosphonic esters, vinylphosphonic acids, beta-halogenated esters of acids derived from trivalent phosphorus, beta-halogenoalkylphosphonic acids and their esters and other derivatives, alpha-aminophosphonic

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acids (the phosphorus analogs of biologically important amino acids), dialkylthiophosphites, derivatives of aminoanabasine, and pyracridones. A number of Kabachnik's investigations deal with the solution of theoretical problems of organic chemistry. This refers to his work on the mechanism of some organic reactions, for instance, the amination of heterocyclic compounds of the pyridine type with amides of alkali metals, the isomerization of beta-halogenoalkylphosphites on heating, and the reactions of aldehydes with phosphorus trichloride.

Kabachnik's most important theoretical work has been in the field of tautomerism. He was the first to develop a quantitative theory of tautomeric equilibrium and also arrived at a significant generalization of the problem in regard to the reactivity of tautomeric and protautomeric dually reacting substances. On the basis of the new theoretical concepts in regard to tautomerism, Kabachnik carried out synthetic and physicochemical investigations, the results of which confirmed the validity of the concepts developed by him.

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